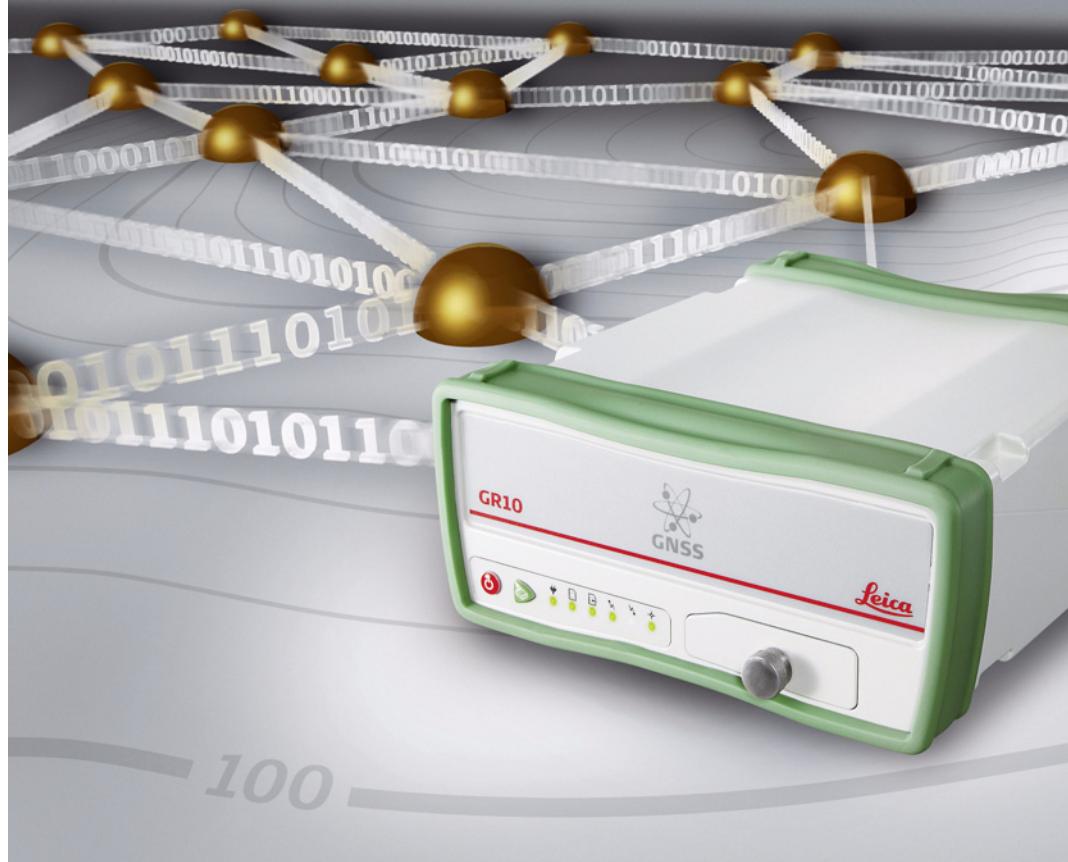




Leica GR10

User Manual



Version 1.0
English

- when it has to be **right**

Leica
Geosystems

Introduction

Purchase



Congratulations on the purchase of a Leica GR10.

This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to "6 Safety Directions" for further information.

Read carefully through the User Manual before you switch on the product.

Product identification

The type and serial number of your product are indicated on the type plate. Enter the type and serial number in your manual and always refer to this information when you need to contact your agency or Leica Geosystems authorised service workshop.

Type: _____

Serial No.: _____

Symbols

The symbols used in this manual have the following meanings:

Type	Description
Danger	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
Warning	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.
Caution	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury and/or appreciable material, financial and environmental damage.
	Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

Trademarks

- Windows is a registered trademark of Microsoft Corporation in the United States and other countries.
- SD is a trademark of the SD Card Association

All other trademarks are the property of their respective owners.

Validity of this manual

This manual applies to the GR10.

Available documentation

Name	Description/Format		
GR10 User Manual	All instructions required in order to operate the product to a basic level are contained in the User Manual. Provides an overview of the product together with technical data and safety directions.	✓	✓

Name	Description/Format		
GR10 Operational Manual (Online Help)	Comprehensive guide to the product and the operation. Includes a description of the hardware installation and common accessories. Software setup is described in detail, along with the technical specifications. The complete manual can be viewed online via the GR10 Web interface.		✓
GNSS Reference Station and Networks - An Introductory Guide	Offers practical advice on how to set up and run individual GNSS reference stations and networks of stations and to provide the services that are required.	✓	✓
GNSS Networks and Reference Stations Equipment List	Detailed list of equipment available for GNSS reference stations including hardware and software.		✓

Refer to the following resources for all GR10 documentation/software:

- the Leica GR10 DVD
- <https://myworld.leica-geosystems.com>



myWorld@Leica Geosystems (<https://myworld.leica-geosystems.com>)

offers a wide range of services, information and training material.

With direct access to myWorld, you are able to access all relevant services whenever it is convenient for you, 24 hours a day, 7 days per week. This increases your efficiency and keeps you and your equipment instantly updated with the latest information from Leica Geosystems.

Service	Description
myProducts	Simply add all Leica Geosystems products that you and your company own. View detailed information on your products, buy additional options or Customer Care Packages (CCPs), update your products with the latest software and keep up-to-date with the latest documentation.
myService	View the service history of your products in Leica Geosystems Service Centers and detailed information on the services performed on your products. For your products that are currently in Leica Geosystems Service Centers view the current service status and the expected end date of service.
mySupport	Create new support requests for your products that will be answered by your local Leica Geosystems Support Team. View the complete history of your Support and view detailed information on each request in case you want to refer to previous support requests.
myTraining	Enhance your product knowledge with the Leica Geosystems Campus - Information, Knowledge, Training. Study the latest online training material or download training material on your products. Keep up-to-date with the latest News on your products and register for Seminars or Courses in your country.

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Description of the System

GR10 General Information

Design

The GR10

- is designed for various permanent and semi-permanent reference station applications, including network RTK, single base station, scientific, campaign, monitoring and seismic studies.
 - collects, stores and disseminates GNSS data.
 - is highly suited to system integration.
 - supports various external devices including communication, meteo and tilt.
-

Satellite tracking

The GR10 can track

- GPS L1/L2 (including L2C)/L5
 - GLONASS L1/L2
 - Galileo E1/E5a/E5b/AltBOC
 - SBAS
-



Once the first operational Galileo satellites are available, a software update will be required.



The GR10 instrument is designed to support Compass. The Compass signal definition is not fully finalised, although, test signals have been tracked in a test environment. As changes may still occur, Leica Geosystems cannot guarantee full Compass compatibility.

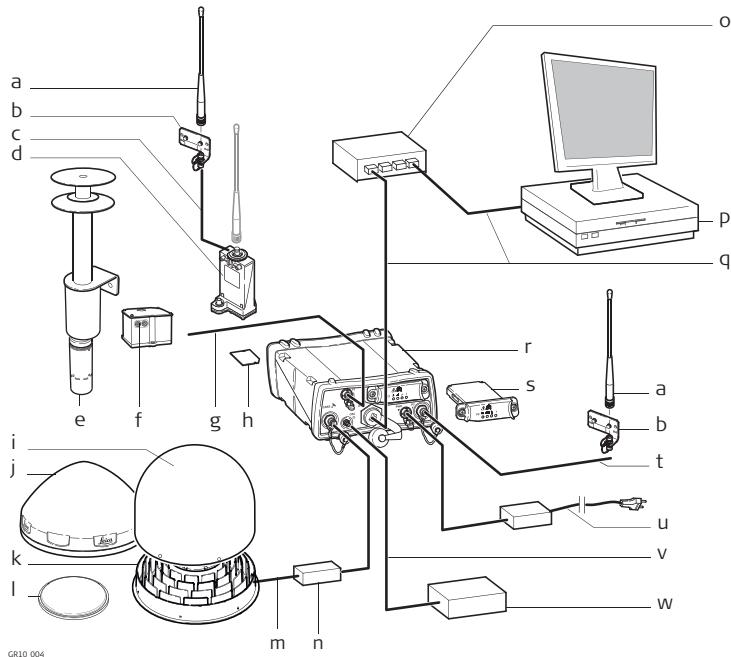
Special features

The instruments are equipped with several special features:

- 50 Hz data logging and streaming.
 - SmartTrack+ measurement engine for higher accuracy and availability.
 - Up to 10 multiple logging sessions and 20 data streams.
 - Multiple data storage formats including MDB, RINEX and Hatanaka.
 - Supports high capacity storage up to 32 GB and intelligent Smart clean-up.
 - Multiple data output formats including Leica, Leica 4G, RTCM 2.x,3.x, LB2, BINEX, CMR, CMR+.
 - Modern, user friendly Web interface GUI, available in different languages.
 - Seamless integration with Leica GNSS Spider.
 - Robust lightweight metal housing.
 - Fully ruggedised to IP67, including a ruggedised Ethernet port.
 - Simple mounting for IT rack, cabinet and wall mount. Unit is also stackable.
 - Built in communications Slot-in port.
 - Integrated device management for external devices.
 - Supports DHCP, DNS, DynDNS and mobile internet.
 - Improved security including IP filtering, access management and HTTPS with SSL.
 - Out of the box plug and play hostname setup.
 - Wide supply voltage 10.5-28 V.
 - Low-power consumption, with 3.0-3.5 W typical.
-

Component overview

The following diagram shows a typical reference station setup and the most common accessories that can be used with a GR10.

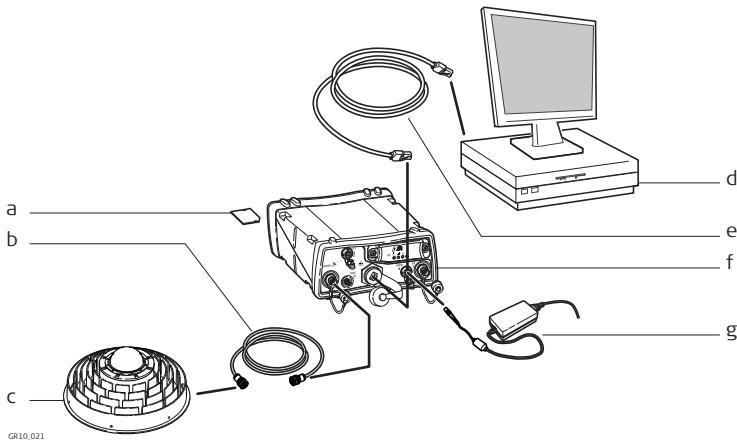


- a) Radio/GSM antenna
- b) Antenna bracket
- c) Antenna cable
- d) GFU housing incl. Radio/GSM device
- e) Meteo sensor
- f) Tilt sensor
- g) Serial cable
- h) SD card
- i) Optional radome for AR25
- j) GNSS antenna, AR10
- k) GNSS antenna, AR25
- l) GNSS antenna, AS10

- m) Antenna cable
- n) Optional lightning protection
- o) Ethernet hub
- p) Computer running GNSS Spider or web interface
- q) Ethernet cable
- r) GR10
- s) Slot-in radio/GSM device
- t) Antenna cable
- u) Power supply
- v) Oscillator cable
- w) External oscillator

Minimum setup components

The following diagram shows the minimum components required to operate a GR10.



- * The GR10 can be operated without the SD card but only data streaming will be possible.

Main components

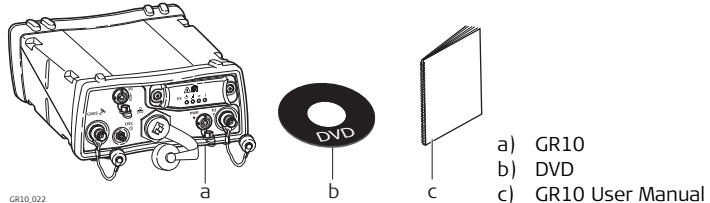
Component	Description
GR10	To provide the storage and streaming of raw satellite data.
Antenna	To receive the satellite signals from the GNSS (Global Navigation Satellite System) satellites
Web interface	Web-based tool to configure the GR10.
Leica GNSS Spider	The reference station office software including comprehensive instrument control and configuration, file download and firmware upload functions which support working with Leica GR10 instruments. Supports the connection to single or multiple reference instruments simultaneously.

1.3

Unpacking the GR10 instrument

Delivery box for GR10

The minimum items delivered with the GR10 include:



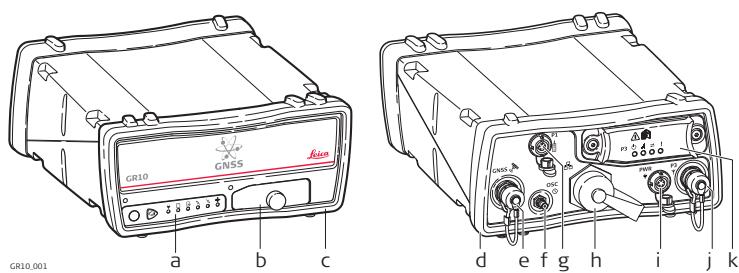
Accessories

Additional equipment such as cables, antennas and power supply required for a complete reference station installation are delivered with the GR10 when ordered. For an overview of a typical reference station installation and the accessories that can be used with the GR10 go to "Component overview". For further information on accessories, please refer to the "GR10 Operational Manual (Online Help)".

1.4

Instrument Components

GR10 components



GR10 operation

The GR10 instrument can be operated by:

- pressing its buttons (ON/OFF button, Function button)
- the GR10 Web interface
- Leica GNSS Spider software
- or with the Leica Binary 2 (LB2) interface. Contact your Leica Geosystems representative for information on LB2 documentation.



The GR10 instrument is delivered with default settings which cover the needs of the typical user. Use the Web interface or Leica GNSS Spider to adjust the GR10 settings.

Operation by Web interface

The Web interface is the main component used to configure and operate the GR10.

Refer to the "GR10 Operational Manual (Online Help)" for a detailed description of the Web Interface.

Supported operating systems for Web interface setup over USB

- Windows XP Professional SP2 and SP3 (32 bit)
- Windows Vista Enterprise SP2 (32 bit)
- Windows Server 2008 SP1 (64 bit)
- Windows 7 Ultimate (32 bit and 64 bit)

Supported web browsers for the GR10 Web interface

Web browser	Supported version
Internet Explorer	7 and higher
Firefox	3.5 and higher
Opera	10 and higher
Safari	4 and higher
Google Chrome	4 and higher



The Web interface is the primary interface between the user and the GR10. To use the Web interface correctly make sure the web browser allows JavaScript to be run. Check the web browsers settings if you have problems using the Web interface.

Web interface security

When accessing the Web interface for the first time use the default **User name** (Admin) and **Password** (12345678).



For security reasons, it is recommended to create a new administrator account when logging in for the first time. After creating the new administrator, log out and relogin with the new user credentials. The default user account can then be deleted. Refer to the "GR10 Operational Manual (Online Help)" for a step-by-step guide.

Operation by Leica GNSS Spider	The reference station software Leica GNSS Spider provides comprehensive instrument functionality, like the Web interface.
	 Some configuration settings are available both in the Web interface and in Leica GNSS Spider. If such settings are configured in the Web interface, and then an Upload Settings or Start is done from Leica GNSS Spider, the settings are overwritten. In this case use the Web interface exclusively for settings that are not available in Leica GNSS Spider.

To operate Leica GNSS Spider, refer to the

- "GR10 Operational Manual (Online Help)" for basic information.
- "Leica GNSS Spider Online Help" for advanced information.

Requirement

- GR10: Leica GNSS Spider v4.0 or later must be installed.

GNSS Spider features

GNSS Spider features:

- Simultaneous configuration and communication with one or many instruments.
 - Monitoring and messaging on instrument key parameters such as power voltage level, data storage availability, instruments internal temperature or events logged on the instrument.
 - Visualisation of satellite tracking status.
 - Transfer of raw data automatically from the instrument to a central data storage.
 - Perform RINEX conversion manually or automatically at different decimation rates and file lengths.
 - FTP push archived data to multiple locations.
 - Perform automatic quality control of archived RINEX data.
 - Manage an entire network of reference stations.
 - Supply single base or network RTK corrections to many users using various communication methods, including for example, Ntrip .
 - Protect and manage access to RTK correction services using the Spider Business Center advanced user access management.
-

Software for GR10

Software type	Description
GR firmware (GR10_x.xx.fw)	The GR10 firmware is called RefWorx. This important system software covers the basic functions of the instrument. The onboard Web interface is integrated into the firmware and cannot be deleted. The English language is integrated into the firmware and cannot be deleted.
Language software (REF_LANG.sxx)	Numerous languages are available for the instrument web server. Language software is also referred to as system language. The system software enables a maximum of three languages which can be stored at any one time - the English language and two other languages. The English language is the default language and cannot be deleted. One language is chosen as the active language.
Windows CE Operating System (GR10_WinCE_x.x.xx.fw)	Windows CE is the underlying operating system on the GR10.
Measurement Engine firmware (ME4.xx.fw)	This file contains the Measurement Engine firmware for the GR10. This firmware is always included in the GR10 firmware file. If an update becomes available the file can be loaded separately onto the GR10.

Software upload

Software for	Description
GR10	All software is stored in the System RAM of the instrument. A new firmware file must be uploaded to the SD card before installation. The file can be uploaded via: <ul style="list-style-type: none">• the GR10 Web interface.• direct copy to the SD card using a computer.• direct FTP access to the SD card. After uploading, the firmware must be transferred from the SD card to the System RAM via the GR10 Web interface. Refer to the "GR10 Operational Manual (Online Help)" for further information. Leica GNSS Spider can also be used to install the firmware. Loading the firmware to the SD card and installing it on the instrument is done in one step when using GNSS Spider. Refer to the "Leica GNSS Spider Online Help" for more information.

General

Use the Leica Geosystems power supplies, batteries, chargers and accessories or accessories recommended by Leica Geosystems to ensure the correct functionality of the instrument.

Power options

Power for the instrument can be supplied either by power supply or batteries. Up to two external power supplies can be connected using a Y-cable.

External power supply: GEV242 (774437), 110 V/240 V AC to 24 V DC power supply unit, supplied by Leica Geosystems.

OR

110 V/240 V AC to 12 V DC power supply unit (722409), supplied by Leica Geosystems.

OR

GEB171 (439038) battery connected via a cable.

OR

Car battery connected via a converter cable supplied by Leica Geosystems.

Y-cable:

GEV243 (774438), Y-cable can be used with GEV242 power supply and GEB171 battery or the existing 12 V power supply (722409). The black Lemo connector on this cable only supports the use of the GEV242 power supply.

OR

GEV172 (733298), Y-cable can be used with any combination of 110 V/240 V AC to 12 V DC power supply (722409) or a GEB171 battery.



For permanent operations use **Uninterruptible Power Supply** units as a back-up in a main power failure.

Installation

Before Installation

Installation location

It is recommended that the instrument is installed so that it is

- protected from mechanical influences and lightning
 - within 70 m of the antenna, without the need to use inline amplifiers.
-

Installation orientation

- For inside assembly, the instrument can be installed in any direction

- When installing the instrument outside, orientate the instrument vertically so that the connector points are pointing downwards
-

Cable installation

Ensure that the cables between the instrument and antenna are positioned to prevent them from becoming bent, stretched or squeezed. For the installation of the cables, the general rules for the installation of electrical wiring apply.



Please consider that a well-planned and thoroughly carried out electric installation not only protects the cables against damage, but also looks professional.



For detailed installation information, refer to the "GNSS Reference Station and Networks - An Introductory Guide".

2.2

Installation Options

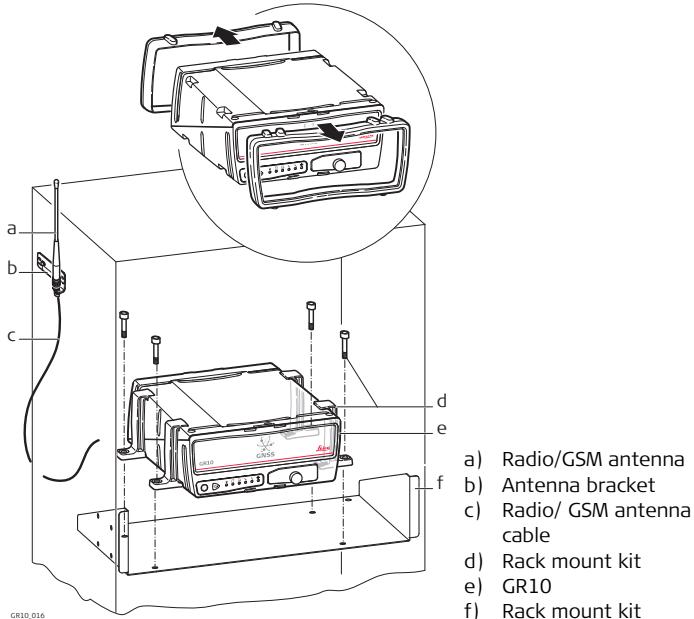
Description

GR10 instruments are designed for various installation cases. Below is a short description of four installation cases for the GR10. Please note that the diagrams do not show all the equipment required for a complete reference station installation. For full installation details, please refer to the

- GNSS Reference Station and Networks - An Introductory Guide.
- GNSS Networks and Reference Stations Equipment List

Rack Mount

Together with the rack mount accessory kit the GR10 can be easily mounted into a standard 19 inch IT rack.



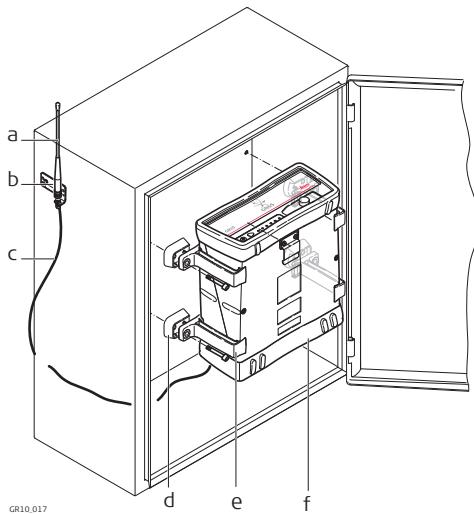
If space in the rack is limited, then the rubber bumpers on the GR10 can be removed. The total height of the rack kit and instrument is then 2U. If the bumpers are removed, please remove the small feet from the mounting brackets.



The radio/GSM antenna must be installed on the outside of the rack if a slot-in or serial device is used.

Wall / Cabinet Mount

Together with the wall mount accessory kit the GR10 can be easily mounted onto an existing wall or structure, or inside an environmental case.



- a) Radio/GSM antenna
- b) Antenna bracket
- c) Radio/GSM antenna cable
- d) Wall mount kit - feet
- e) Wall mount kit - bracket
- f) Rubber bumper



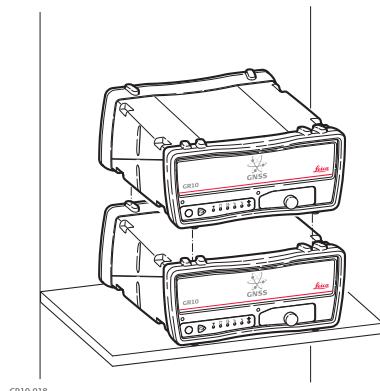
If space in the cabinet is limited, then the rubber bumpers on the GR10 can be removed. If the bumpers are removed, please remove the small feet from the mounting brackets.



The radio/GSM antenna must be installed on the outside of the rack if a slot-in or serial device is used.

Free Standing / Stacking

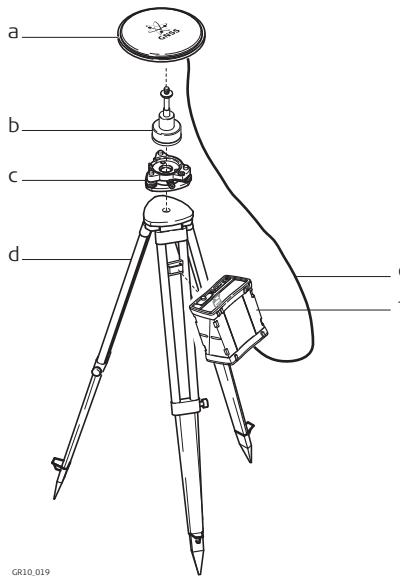
The GR10 is designed to allow stable free standing installation and stacking for easy configuration of multiple receivers.



When stacking multiple GR10 instruments on top of each other, the rubber bumpers must be on.

Tripod

The GR10 has a built-in Tripod mount to allow attachment to all Leica Geosystems Tripods.



- a) AS10
- b) GNSS antenna carrier with
5/8 inch screw
- c) Tribrach
- d) Tripod
- e) Antenna cable
- f) GR10



When using the GR10 on a tripod, the rubber bumpers must be on.

3

3.1

User Interface

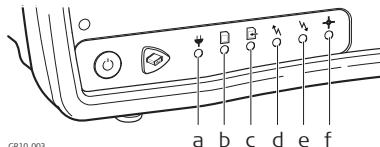
LED Indicators on GR10

LED indicators

Description

The GR10 has Light Emitting Diode indicators. They indicate the basic instrument status.

Diagram



- a) Power LED
- b) SD card LED
- c) Raw data logging LED
- d) RT out data stream LED
- e) RT in data stream LED
- f) Position LED

Description of the LED's

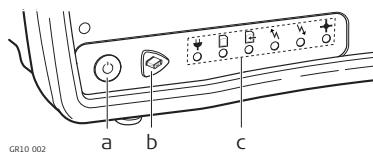
IF the	is	THEN
	off	External power is not connected or power is off
	green	The power level of the connected power source is between 40-100%.
	yellow	The power level of the connected power source is between 10-40%. The LED indicates the overall power status. If a second external power source is connected using a Y-cable, both power sources are used simultaneously. When the LED is yellow, the power level on both external power sources is low, 10-40%.
	red	The power level of the connected power source is between 1-10%. Recommended user action: Switch to a new power source.
	off	No SD card inserted or power is off.
	green	SD card is inserted. The free space on the SD card is greater than 20%.
	yellow	The free space on the SD card is below 20%. Recommended user action: Activate the Smart clean-up or the automatic file delete for each logging session.
	red	SD card is full. Data logging has stopped. Recommended user action: Immediately activate the Smart clean-up or the automatic file delete for each logging session.

IF the	is	THEN
 Raw data logging LED	off	No active logging sessions or power is off.
	green	Active logging sessions are configured on the instrument and data is being logged
	yellow	Active logging sessions are configured but Smart clean-up is deleting data from all or some of the configured logging sessions.  Recommended user action: Check the remaining space of the SD card and delete old data if necessary.
	red	Active logging sessions are configured but the SD card is full or no navigated position is available.  Recommended user action: Check the SD card and the tracking status.
 RT out data stream LED	off	No active data stream is configured or power is off.
	green	One or more data streams are configured and active. Data is being streamed.
	red	Data streams are active but no data is streamed.  Recommended user action: Check that data is tracked and a navigated position is available. Check that the correct reference position is entered.
 RT in data stream LED	-	Currently not supported.
 Position LED	off	The instrument is switched off.
	flashing green	The instrument is tracking satellites but no position is available.
	green	A navigated position is available.
	red	No satellites are tracked and no navigated position is available.

3.2

Keyboard

GR10 Keyboard



GR10_002

- a) ON/OFF button
- b) Function button
- c) LED's



The instrument can be turned on and off by holding down the ON/OFF button for 2 s. A green steady light at the power LED indicates that the instrument is turned on and ready.

ON/OFF button

Button	Function
	If GR10 already off: Turns on GR10 when held for 2 s.
	If GR10 already on: Turns off GR10 when held for 2 s.



Hold the ON/OFF button for 10 s, to force the instrument to turn off. Instrument settings and some data can be lost when using this method.

Function button



All the following functions described assume the GR10 is already on.

Button	Function
	The Function and ON/OFF button work in combination and allow a number different functions as described in "Button combinations". The Function button switches between these different functions.

Button combinations

Buttons	How to
+ 2 s	Activate dual button functionality Press and hold both buttons for 2 s until all LEDs are flashing. After 1 s, the Raw data logging LED starts flashing. The following instrument commands are now activated.
	Start/Stop all logging sessions Activate the dual button functionality. If all logging sessions had been off, the Raw data logging LED is flashing green.

Buttons	How to
 3 s	<ul style="list-style-type: none"> Press the Function button for 3 s to START all configured logging sessions if the Raw data logging LED is flashing green. <p>OR</p> <p>If any logging session had been active, the Raw data logging LED is flashing red.</p> <ul style="list-style-type: none"> Press the Function button for 3 s to STOP all active logging sessions if the Raw data logging LED is flashing red. <p>After logging has been started or stopped, the LED and instrument functionality goes back to general behaviour.</p>
 1 X  3 s	<p>Start/Stop all data streams</p> <p>Activate the dual button functionality.</p> <p>Press the Function button until the  RT out data streams LED starts flashing.</p> <p>If all data streams had been off, the RT out data stream LED is flashing green.</p> <ul style="list-style-type: none"> Press the Function button for 3s to START all configured data streams if the RT out data steam LED is flashing green. <p>If any data stream had been active, the RT out data stream LED is flashing red.</p> <p>OR</p> <ul style="list-style-type: none"> Press the Function button for 3s to STOP all active data streams if the RT out data stream LED is flashing red. <p>After data streams have been started or stopped, the LED and instrument functionality goes back to general behaviour.</p>
 2 X  3 s	<p>Initialise the measurement engine</p> <p>Activate the dual button functionality.</p> <p>Press the Function button until the  Position LED starts flashing.</p> <ul style="list-style-type: none"> Press the Function button for 3s to reset the measurement engine. This action will delete all almanac and ephemeris information and the instrument will take a few minutes to restart tracking satellites. <p>After the measurement engine has been initialised, the LED and instrument functionality goes back to general behaviour.</p>

Buttons	How to
 3 X  3 s	<p>Format receiver settings</p> <p>Activate the dual button functionality.</p> <p>Press the Function button until the  Power LED starts flashing:</p> <ul style="list-style-type: none"> • Press the Function button for 3 s to set all configured instrument settings back to factory default values. <p>After the system format is completed, the LED and instrument functionality goes back to general behaviour.</p>
 4 X  3 s	<p>Format the SD card</p> <p>Activate the dual button functionality.</p> <p>Press the Function button until the  SD card LED starts flashing:</p> <ul style="list-style-type: none"> • Press the Function button for 3 s to format the SD card. <p>After the SD card format is completed, the LED and instrument functionality goes back to general behaviour.</p>
 5 X	<p>Exit combined button functionality</p> <ul style="list-style-type: none"> • Use the buttons functionality as described above. <p>OR</p> <ul style="list-style-type: none"> • To return to normal instrument functionality, press the Function button until all LEDs stop flashing.

3.3

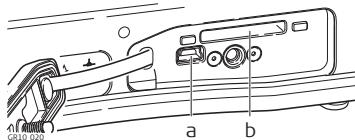
USB and SD Card Cover

USB port and SD card slot

Description

The GR10 has a USB port and an SD card slot.

Diagram



- a) USB port
- b) SD card slot

USB port

The USB port can be used to:

- connect the GR10 to a computer and access the GR10 Web interface and FTP server.
- connect the GR10 to a CS10/CS15 field controller and access the GR10 Web interface.

SD card slot

Data is stored on a removable SD card.

For more information on how to work with the SD card, refer to "4.2 Working with the Memory Device"



If no SD card is inserted, data storage is not possible.



Unplugging connection cables or removing the SD card during data logging or streaming can cause loss of data. Switch off the instrument before removing the SD card.



While other SD cards can be used, Leica Geosystems recommends only using Leica SD cards. Leica Geosystems is not responsible for data loss or any other error that can occur while using a non-Leica card.



SD cards can directly be used in the Leica USB Card Reader (767895 MCR7). Other computer card drivers can require an adaptor.



If formatting the SD card is necessary, we highly recommend to format the SD card on the instrument. Refer to the GR10 Operational Manual (Online Help) for detailed instructions.

SD card capacity

Maximum supported capacity: 32 GB.

4

4.1

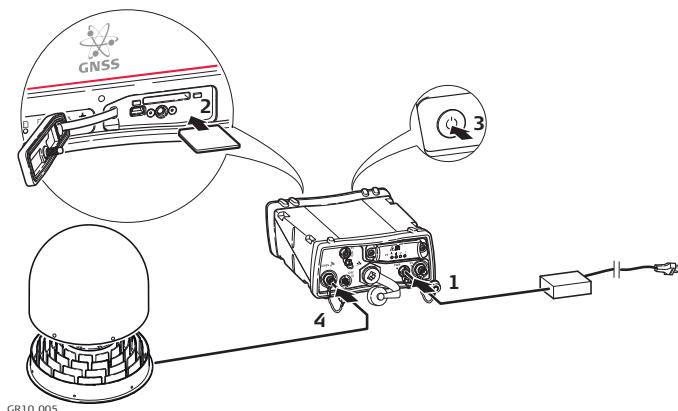
4.1.1

Operation

Equipment Setup

Basic Setup

Description

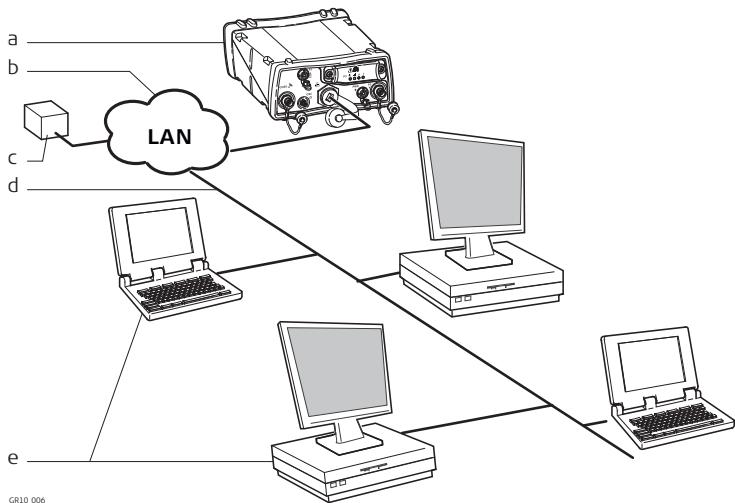


Step	Description
1.	Plug the power cable/power supply into the GR10.
2.	Insert the SD card into the SD card slot. For more information on how to work with the SD card, refer to "4.2 Working with the Memory Device".
3.	Turn on the GR10.
4.	Attach the antenna cable, for example the GEV194, 1.8 m antenna cable, to the instrument's antenna port and to the connector on the antenna.
5.	To access the instrument via Ethernet or USB refer to: <ul style="list-style-type: none">• "4.1.2 Setup via Web Interface over Ethernet and DHCP"• "4.1.3 Install USB drivers".• "4.1.7 Setup via Web Interface over USB" Refer to the "GR10 Operational Manual (Online Help)" for detailed information on the GR10 Web interface.

4.1.2

Setup via Web Interface over Ethernet and DHCP

Setup via Web Interface over Ethernet and DHCP



- a) GR10
- b) Local network (LAN)
- c) DHCP server
- d) Ethernet cable
- e) Computers with web interface

Step	Description
1.	Start the computer.
2.	To connect the GR10 to the local LAN supporting DHCP, plug an Ethernet cable into the Ethernet port on the back of the GR10.
3.	Turn on the GR10.
4.	Open a browser window on your computer.
5.	Type "GR*****" into the browsers address field, where ***** is the serial number of the instrument. For example, GR1700001.
6.	The GR10 Web interface will now be accessible.
7.	Use the default User name (Admin) and Password (12345678). ☞ After logging in the first time you must create a new user account, including a new user name and password. The default user account can then be deleted. Refer to the GR10 Operational Manual (Online Help) for a step-by-step guide.
8.	Configure the GR10 for all required settings. ☞ Refer to the GR10 Operational Manual (Online Help) for further details on using the instruments Web interface.

4.1.3

Install USB drivers

Before you begin

Before connecting the GR10 to a computer using a USB cable, you must first install USB drivers. To install the USB drivers refer to:

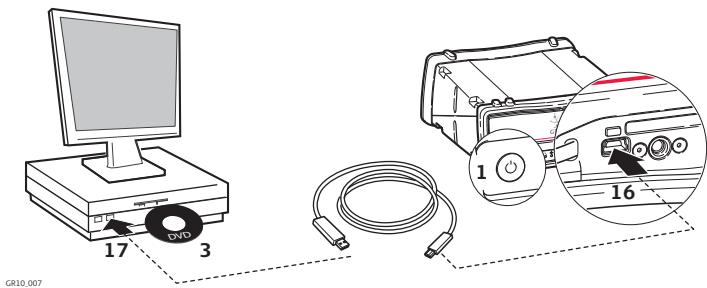
- "4.1.4 Install USB drivers for Windows XP operating systems".
- "4.1.5 Install USB drivers for Windows Vista operating systems".
- "4.1.6 Install USB drivers for Windows 7 operating systems".

 Only one GR10 can be connected to the computer via USB at a time.

4.1.4

Install USB drivers for Windows XP operating systems

Install USB drivers for Windows XP for the first time



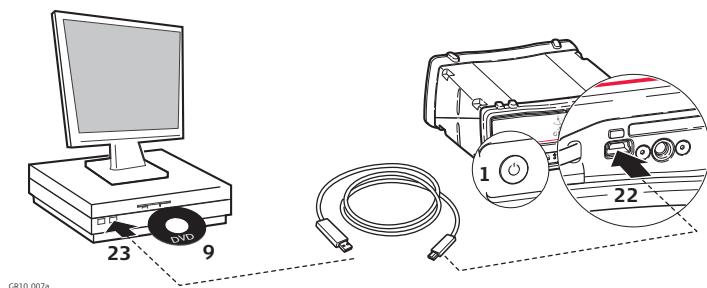
Step	Description
1.	Turn on the GR10.
2.	Start the computer.
3.	Insert the Leica GR10 DVD.
4.	Run the installer executable depending on your CPU and operating system to install the drivers necessary for your GR10. a) 32 bit CPU: SetupViva&GR_uSB_32bit.exe b) 64 bit CPU: SetupViva&GR_uSB_64bit.exe c) Itanium 64 bit CPU: SetupViva&GR_uSB_64bit_itanium.exe
5.	The Welcome to InstallShield Wizard for Leica Viva & GR USB drivers window appears.
	Make sure all GR10 or Viva devices are disconnected from the computer.
6.	Click Next> .
7.	The Ready to Install the Program window appears.
8.	Click Install . The drivers are installed on your computer.
9.	Click Continue Anyway every time a window pops up saying that the software has not passed the Windows Logo testing.
10.	The InstallShield Wizard Completed window appears.
11.	Read the instructions and check the box, I have read the instructions . These instructions are listed in detail in the following steps.
12.	Click Finish to exit the wizard.

Step	Description
13.	Click Yes to restart the system so all changes take effect.  For Windows XP users with Service Pack 3: Windows does not require a restart.
14.	Loosen the screw on the SD card/USB port cover.
15.	Open the SD card/USB port cover.
16.	Plug the USB cable into the USB port on the GR10.
17.	Plug the USB cable into the USB port of the computer.
18.	Wait until the new hardware wizard starts up automatically. Select, No, not this time and click Next> .  It can take some time for the wizard to start.
19.	Click Next> to install the software automatically.
20.	Click Continue Anyway when a window pops up saying that this software has not passed the Windows Logo testing.
21.	Click Finish to exit the wizard.
22.	Another found new hardware wizard starts up automatically. Select, No, not this time and click Next> .
23.	Click Next> to install the software automatically.
24.	Click Finish to exit the wizard.  Windows will show searching for IP address . Ignore this and go to the next step.
25.	Run shortcut Configure GR connection which has been configured on the Windows desktop.  There are two more shortcuts created for the Leica GS and CS. These shortcuts can be ignored, unless these devices are needed on this computer. Refer to the GS or CS User Manual for further information.
26.	A DOS window is opened and a batch file is started to configure the IP settings for the RNDIS network adapter.
27.	Press any key to close the DOS window.
28.	Disconnect and reconnect the USB cable.
29.	Open a browser and type in the IP address: 192.168.254.2 to access the GR10 web interface.
30.	Use the default User name (Admin) and Password (12345678).  After logging in the first time you must create a new user account, including a new user name and password. The default user account can then be deleted. Refer to the GR10 Operational Manual (Online Help) for a step-by-step guide.
31.	Configure the GR10 for all required settings.
	 Please make sure that JavaScript is allowed to run on the web browser. Check the browser settings if you have problems using the Web interface.

4.1.5

Install USB drivers for Windows Vista operating systems

Install USB drivers
for Windows Vista
for the first time



GR10_007a

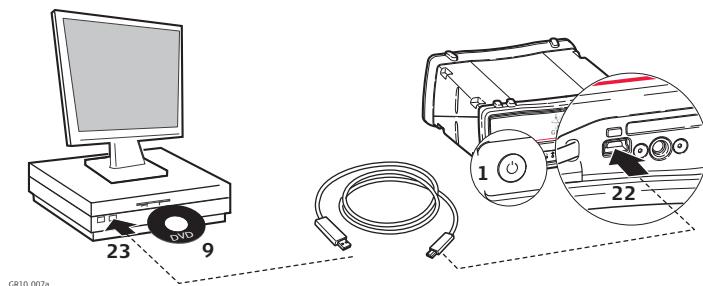
Step	Description
1.	Turn on the GR10.
2.	Start the computer.
3.	Disable the User Account Control before installing the drivers.
4.	Go to Start ⇒ Control Panel ⇒ User Accounts and Family Safety (or User Accounts , if you are connected to a network domain) ⇒ User Accounts .
5.	Select Turn User Account Control on or off .  Enter the computer administrators password if prompted.
6.	Disable the check box, Use User Account Control (UAC)to help protect your computer .
7.	Click OK .
8.	Restart the computer for all changes to take effect.
9.	Insert the Leica GR10 DVD.
10.	Run the installer executable depending on your CPU and operating system to install the drivers necessary for your GR10. a) 32 bit CPU: SetupViva&GR_USB_32bit.exe b) 64 bit CPU: SetupViva&GR_USB_64bit.exe c) Itanium 64 bit CPU: SetupViva&GR_USB_64bit_itanium.exe
11.	Wait until the Mobile Device Center Driver Update is finished.
12.	The Welcome to InstallShield Wizard for Leica Viva & GR USB drivers window appears.
13.	Click Next> .
14.	The Ready to Install the Program window appears.
15.	Click Install . The drivers are installed on your computer.
16.	Click Install this driver software anyway every time a window pops up saying that the software has not passed the Windows Logo testing.
17.	The InstallShield Wizard Completed window appears.
18.	Read the instructions and check the box, I have read the instructions . These instructions are listed in detail in the following steps.

Step	Description
19.	Click Finish to exit the wizard.
20.	Loosen the screw on the SD card/USB port cover.
21.	Open the SD card/USB port cover.
22.	Plug the USB cable into the USB port on the GR10.
23.	Plug the USB cable into the USB port of the computer.  Windows will show searching for IP address . Ignore this and go to the next step.
24.	Run shortcut Configure GR connection which has been configured on the Windows desktop.  There are two more shortcuts created for the Leica GS and CS. These shortcuts can be ignored, unless these devices are needed on this computer. Refer to the GS or CS User Manual for further information.
25.	A DOS window is opened and a batch file is started to configure the IP settings for the RNDIS network adapter.
26.	Press any key to close the DOS window.
27.	Disconnect and reconnect the USB cable.
28.	Open a browser and type in the IP address: 192.168.254.2 to access the GR10 web interface.
29.	Use the default User name (Admin) and Password (12345678).  After logging in the first time you must create a new user account, including a new user name and password. The default user account can then be deleted. Refer to the GR10 Operational Manual (Online Help) for a step-by-step guide.
30.	Configure the GR10 for all required settings.
	Please make sure that JavaScript is allowed to run on the web browser. Check the browser settings if you have problems using the Web interface.

4.1.6

Install USB drivers for Windows 7 operating systems

Install USB drivers
for Windows 7 for
the first time



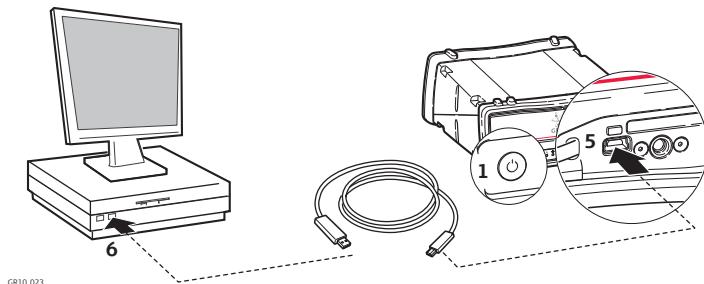
Step	Description
1.	Turn on the GR10.
2.	Start the computer.
3.	Disable the User Account Control before installing the drivers.
4.	Go to Start ⇒ Control Panel ⇒ User Accounts and Family Safety (or User Accounts , if you are connected to a network domain) ⇒ User Accounts .
5.	Go to Change User Account Control settings.
6.	Select level, Never Notify and click OK .
7.	When asked to allow the change, click Yes to confirm.
8.	Restart the computer for all changes to take effect.
9.	Insert the Leica GR10 DVD.
10.	Run the installer executable depending on your CPU and operating system to install the drivers necessary for your GR10. a) 32 bit CPU: SetupViva&GR_uUSB_32bit.exe b) 64 bit CPU: SetupViva&GR_uUSB_64bit.exe c) Itanium 64 bit CPU: SetupViva&GR_uUSB_64bit_itanium.exe
11.	Wait until the Mobile Device Center Driver Update is finished.
12.	The Welcome to InstallShield Wizard for Leica Viva & GR USB drivers window appears.
13.	Click Next> .
14.	The Ready to Install the Program window appears.
15.	Click Install . The drivers will be installed on your computer.
16.	Click Install this driver software anyway every time a window pops up saying that the software has not passed the Windows Logo testing.
17.	The InstallShield Wizard Completed window appears.
18.	Read the instructions and check the box, I have read the instructions . These instructions are listed in detail in the following steps.
19.	Click Finish to exit the wizard.

Step	Description
20.	Loosen the screw on the SD card/USB port cover.
21.	Open the SD card/USB port cover.
22.	Plug the USB cable into the USB port on the GR10.
23.	Plug the USB cable into the USB port of the computer.  Windows will show searching for IP address . Ignore this and go to the next step.
24.	Run shortcut Configure GR connection which has been configured on the Windows desktop.  There are two more shortcuts created for the Leica GS and CS. These shortcuts can be ignored, unless these devices are needed on this computer. Refer to the GS or CS User Manual for further information.
25.	A DOS window is opened and a batch file is started to configure the IP settings for the RNDIS network adapter.
26.	Press any key to close the DOS window.
27.	Disconnect and reconnect the USB cable.
28.	Open a browser and type in the IP address: 192.168.254.2 to access the GR10 web interface.
29.	Use the default User name (Admin) and Password (12345678).  After logging in the first time you must create a new user account, including a new user name and password. The default user account can then be deleted. Refer to the GR10 Operational Manual (Online Help) for a step-by-step guide.
30.	Configure the GR10 for all required settings.
	 Please make sure that JavaScript is allowed to run on the web browser. Check the browser settings if you have problems using the Web interface.

4.1.7

Setup via Web Interface over USB

Setup via Web Interface over USB



Step	Description
1.	Turn on the GR10.
2.	Start the computer.
3.	Loosen the screw on the SD card/USB port cover.
4.	Open the SD card/USB port cover.
5.	Plug the USB cable into the USB port on the GR10.
6.	Plug the USB cable into the USB port of the computer.
7.	Open a browser and type in the IP address: 192.168.254.2 to access the GR10 Web interface.
8.	Use the default User name (Admin) and Password (12345678). ☞ After logging in the first time you must create a new user account, including a new user name and password. The default user account can then be deleted. Refer to the GR10 Operational Manual (Online Help) for a step-by-step guide.
9.	Configure the GR10 for all required settings.

4.2

Working with the Memory Device



- Keep the card dry.
- Use it only within the specified temperature range.
- Do not bend the card.
- Protect the card from direct impacts.

⚠ Warning

The SD card must not be removed while the instrument is writing data to the card. To remove the SD card safely, turn off the instrument beforehand.

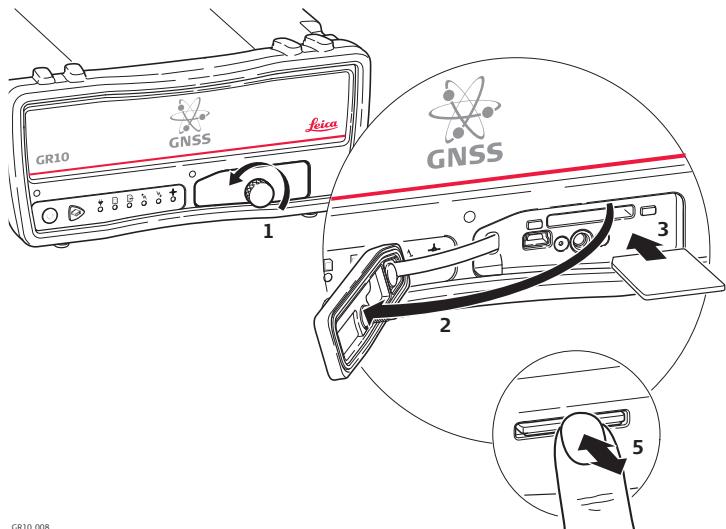
⚠ Warning

Ensure that the instrument is off before inserting the SD card. Switching on the instrument will ensure the necessary folder structure is available on the SD card.



Failure to follow these instructions could result in data loss and/or permanent damage to the card.

**Insert and remove
an SD card into
GR10 step-by-step**



GR10_008

Step	Description
	The SD card is inserted into a slot inside the SD card/USB port cover on the front of the instrument.
1.	Loosen the screw on the SD card/USB port cover.
2.	Open the SD card/USB port cover.
3.	Place the SD card into the slot. The card should be held with the contacts downwards and facing the slot. Do not touch the contacts.
4.	Slide the card firmly into the slot until it clicks into position.
5.	To remove the SD card, gently press inwards on the card to release it from the slot.
6.	Place the SD card/USB port cover back over the slot and tighten the cover screw.

4.3

Working with Radio, Modem and GSM Devices

Description

Various devices can be used with the GR10, including

- GSM/Radio GFU devices connected via a serial port
- Slot-in devices
- External Modems connected via a serial port
- External Radios connected via a serial port

4.3.1

Serial Devices

Devices fitting into a GFU housing

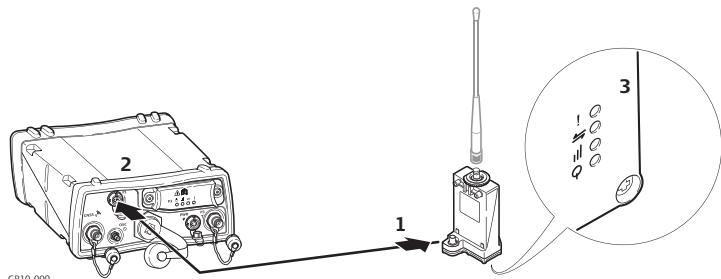
Digital cellular phones fitting into a GFU housing

Digital cellular phone	GFU housing
Siemens MC75	GFU24
CDMA MultiTech MTMMC-C (US)	GFU19, GFU26
CDMA MultiTech MTMMC-C (CAN)	GFU25

Radios fitting into a GFU housing

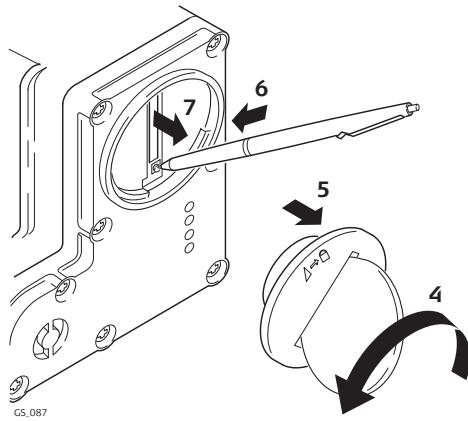
Radio	GFU housing
Satellite 3AS, transceive	GFU14

Connecting a GFU device



Step	Description
1.	Connect the GEV167 GFU cable to the serial port on the GFU housing.
2.	Connect the GEV167 GFU cable to the serial port on the GR10.
3.	The GFU device is successfully connected to the instrument when the LEDs on the GFU are on.

**Insert and remove
a SIM card step-by-
step for an
external GFU
device**



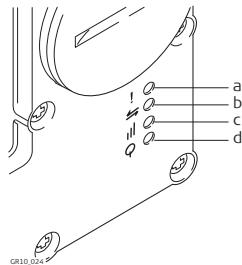
Step	Description
1.	The SIM card is inserted into a slot on the bottom of the GFU housing.
2.	Take the SIM card, a coin and a pen.
3.	Locate the SIM card screw, that covers the SIM card slot, on the bottom of the GFU housing.
4.	Insert the coin into the groove of the SIM card screw.
5.	Turn the coin anticlockwise to loosen the SIM card screw.
6.	Remove the SIM card screw from the housing.
7.	Using the pen, press the small button of the SIM card slot to eject the SIM card holder.
8.	Take the SIM card holder out off the housing.
9.	Put the SIM card into the SIM card holder, the chip facing up.
10.	Insert the SIM card holder into the SIM card slot, the chip facing the connectors inside the slot.
11.	Place the SIM card screw back on the housing.
12.	Insert the coin into the groove of the SIM card screw.
	Turn the coin clockwise to tighten the SIM card screw.

LED indicators

Description

Each GFU housing for a radio or digital cellular phones has Light Emitting Diode indicators on the bottom side. They indicate the basic device status.

Diagram



- a) Warning LED, available for Satelline 3AS
- b) Data transfer LED
- c) Signal strength LED
- d) Power LED

Description of the LED's

IF the	on	is	THEN
Warning LED	GFU14 with Satelline 3AS	red	the device is in the configuration mode controlled from the PC via cable.
Data transfer LED	any device	off	data is not being transferred.
		green or flashing green	data is being transferred.
Signal strength LED	GFU19 (US), GFU25 (CAN), GFU26 (US) with CDMA MultiTech MTMMC-C	red	device is on, not registered on the network.
		flashing red	device is on, registered on the network.
		off	download mode or device is off.
	GFU24 with Siemens MC75	red	call is in progress.
		red: long flash, long break	no SIM card inserted, no PIN entered or network search, user authentication or network login in progress.
		red: short flash, long break	logged onto network, no call in progress.
		red: flashing red, long break	GPRS PDP context activated.
		red: long flash, short break	Packet switched data transfer is in progress.
		off	device is off.

IF the	on	is	THEN
GFU14 with Satelline 3AS		red or flashing red	the communication link, Data Carrier Detection , is okay on the roving receiver.
		off	the DCD is not okay.
Power LED	any device	off	power is off.
		green	power is okay.

4.3.2

Slot-in Devices

Devices fitting into the GR10 GNSS instrument

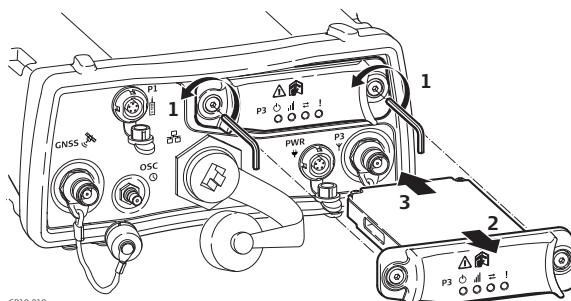
Digital cellular phones fitting into the GR10 slot-in port (P3)

Digital cellular phone	Device
Telit 3G GSM/GPRS/UMTS	SLG1-2

Radios fitting into the GR10 slot-in port (P3)

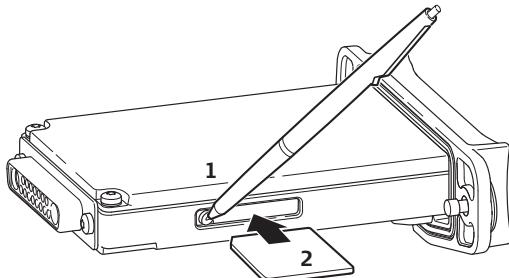
Radio	Device
Satelline TA11	SLR1-2

Insert and remove a slot-in-device step-by-step



Step	Description
1.	Loosen the screws of the Communication Slot-in port (P3) with the Allen key that is supplied with the slot-in device.
2.	Remove the compartment cover and attach it to the slot-in device.
3.	Insert the slot-in device into the P3 Slot-in port. ☞ The LED's on the device must point downwards.
4.	Tighten the screws. ☞ All screws have to be tightened to ensure that the instrument is waterproof.
5.	Attach the antenna for the slot-in device to Communication Slot-in port Antenna (P3), which is located below the Slot-in port next to the Power port (PWR).

Insert and remove a SIM card step-by-step



GR10_011

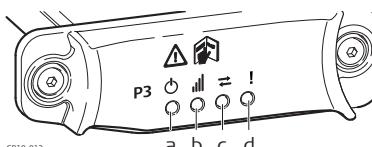
	Description
	The SIM card is inserted into a slot on the side of the SLG1-2.
	Take the SIM card and a pen.
1.	Using the pen, press the small button of the SIM card slot to eject the SIM card holder.
2.	Take the SIM card holder out of the SLG1-2.
3.	Place the SIM card into the SIM card holder, the chip facing up.
4.	Insert the SIM card holder into the SIM card slot, the chip facing the connectors inside the slot.

LED indicators

Description

Each slot-in-device for a radio or digital cellular phones has Light Emitting Diode indicators on the bottom side. They indicate the basic device status.

Diagram



GR10_012

- a) Mode LED, available for Satelline TA11
- b) Signal strength LED
- c) Data transfer LED
- d) Power LED

Description of the LEDs

IF the	on	is	THEN
Mode LED	SLR1-2 with Satelline TA11	red	the device is in the programming mode controlled from the PC via cable.
Data transfer LED	any device	off	data is not being transferred.
		flashing green	data is being transferred.

IF the	on	is	THEN
Signal strength LED	SLG1-2 with Telit 3G	red	call is in progress.
		red: long flash, long break	no SIM card inserted, no PIN entered or network search, user authentication or network login in progress.
		red: short flash, long break	logged on to network, no call in progress.
		red: flashing red, long break	GPRS PDP context activated.
		red: long flash, short break	Packet switched data transfer is in progress.
		off	device is off.
Power LED	any device	red	the communication link, Data Carrier Detection , is okay on the roving instrument.
		flashing red	the communication link, Data Carrier Detection , is okay on the roving instrument, but signal is weak.
		off	the DCD is not okay.
		green	power is okay.

5

Care and Transport

5.1

Transport

Transport in a road vehicle

Never carry the product loose in a road vehicle, as it can be affected by shock and vibration. Always carry the product in its transport container and secure it.

Shipping

When transporting the product by rail, air or sea, always use the complete original Leica Geosystems packaging, transport container and cardboard box, or its equivalent, to protect against shock and vibration.

5.2

Storage

Product

Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "7 Technical Data" for information about temperature limits.

Li-Ion batteries

- Refer to "7 Technical Data" for information about storage temperature range.
 - At the recommended storage temperature range, batteries containing a 10% to 50% charge can be stored for up to one year. After this storage period the batteries must be recharged.
 - Remove batteries from the product and the charger before storing.
 - After storage recharge batteries before using.
 - Protect batteries from damp and wetness. Wet or damp batteries must be dried before storing or use.
 - A storage temperature range of -20°C to +30°C/-4°F to 86°F in a dry environment is recommended to minimise self-discharging of the battery.
-

5.3

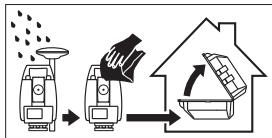
Cleaning and Drying

Product and accessories

- Use only a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with water or pure alcohol. Do not use other liquids; these may attack the polymer components.
-

Damp products

Dry the product, the transport container, the foam inserts and the accessories at a temperature not greater than 40°C/104°F and clean them. Do not repack until everything is dry. Always close the transport container when using in the field.



Cables and plugs

Keep plugs clean and dry. Blow away any dirt lodged in the plugs of the connecting cables.

6

6.1

Safety Directions

General Introduction

Description

The following directions enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.

The person responsible for the product must ensure that all users understand these directions and adhere to them.

6.2

Intended Use

Permitted use

- Carrying out measurement tasks using various GNSS measuring techniques.
 - Recording GNSS and point related data.
 - Data communication with external appliances.
 - Measuring raw data and computing coordinates using carrier phase and code signal from GNSS satellites.
-

Adverse use

- Use of the product without instruction.
- Use outside of the intended limits.
- Disabling safety systems.
- Removal of hazard notices.
- Opening the product using tools, for example screwdriver, unless this is permitted for certain functions.
- Modification or conversion of the product.
- Use after misappropriation.
- Use of products with recognisable damages or defects.
- Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems.
- Inadequate safeguards at the working site, for example when measuring on roads.
- Controlling of machines, moving objects or similar monitoring application without additional control- and safety installations.



Warning

Adverse use can lead to injury, malfunction and damage.

It is the task of the person responsible for the equipment to inform the user about hazards and how to counteract them. The product is not to be operated until the user has been instructed on how to work with it.

6.3

Limits of Use

Environment

Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.



Danger

Local safety authorities and safety experts must be contacted before working in hazardous areas, or close to electrical installations or similar situations by the person in charge of the product.

6.4

Responsibilities

Manufacturer of the product

Leica Geosystems AG, CH-9435 Heerbrugg, hereinafter referred to as Leica Geosystems, is responsible for supplying the product, including the user manual and original accessories, in a safe condition.

Manufacturers of non Leica Geosystems accessories

The manufacturers of non Leica Geosystems accessories for the product are responsible for developing, implementing and communicating safety concepts for their products, and are also responsible for the effectiveness of those safety concepts in combination with the Leica Geosystems product.

Person in charge of the product

The person in charge of the product has the following duties:

- To understand the safety instructions on the product and the instructions in the user manual.
 - To be familiar with local regulations relating to safety and accident prevention.
 - To inform Leica Geosystems immediately if the product and the application becomes unsafe.
 - To ensure that the national laws, regulations and conditions for the operation of radio transmitters are respected.
-

Warning

The person responsible for the product must ensure that it is used in accordance with the instructions. This person is also accountable for the training and the deployment of personnel who use the product and for the safety of the equipment in use.

6.5

Hazards of Use

Warning

The absence of instruction, or the inadequate imparting of instruction, can lead to incorrect or adverse use, and can cause accidents with far-reaching human, material, financial and environmental consequences.

Precautions:

All users must follow the safety directions given by the manufacturer and the directions of the person responsible for the product.

Caution

Watch out for erroneous measurement results if the product has been dropped or has been misused, modified, stored for long periods or transported.

Precautions:

Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the product has been subjected to abnormal use and before and after important measurements.

Danger

Because of the risk of electrocution, it is dangerous to use poles and extensions in the vicinity of electrical installations such as power cables or electrical railways.

Precautions:

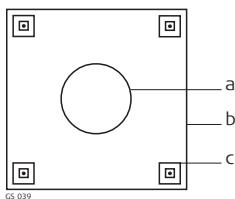
Keep at a safe distance from electrical installations. If it is essential to work in this environment, first contact the safety authorities responsible for the electrical installations and follow their instructions.



 Warning	<p>During dynamic applications, for example stakeout procedures there is a danger of accidents occurring if the user does not pay attention to the environmental conditions around, for example obstacles, excavations or traffic.</p> <p>Precautions: The person responsible for the product must make all users fully aware of the existing dangers.</p>
 Warning	<p>Inadequate securing of the working site can lead to dangerous situations, for example in traffic, on building sites, and at industrial installations.</p> <p>Precautions: Always ensure that the working site is adequately secured. Adhere to the regulations governing safety and accident prevention and road traffic.</p>
 Warning	<p>If computers intended for use indoors are used in the field there is a danger of electric shock.</p> <p>Precautions: Adhere to the instructions given by the computer manufacturer regarding field use with Leica Geosystems products.</p>
 Caution	<p>If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged or people can sustain injury.</p> <p>Precautions: When setting-up the product, make sure that the accessories are correctly adapted, fitted, secured, and locked in position. Avoid subjecting the product to mechanical stress.</p>
 Warning	<p>If the product is used with accessories, for example masts, staffs, poles, you may increase the risk of being struck by lightning.</p> <p>Precautions: Do not use the product in a thunderstorm.</p>
 Danger	<p>If the product is used with accessories, for example on masts, staffs, poles, you may increase the risk of being struck by lightning. Danger from high voltages also exists near power lines. Lightning, voltage peaks, or the touching of power lines can cause damage, injury and death.</p> <p>Precautions:</p> <ul style="list-style-type: none"> • Do not use the product in a thunderstorm as you can increase the risk of being struck by lightning. • Be sure to remain at a safe distance from electrical installations. Do not use the product directly under or close to power lines. If it is essential to work in such an environment contact the safety authorities responsible for electrical installations and follow their instructions. • If the product has to be permanently mounted in an exposed location, it is advisable to provide a lightning conductor system. A suggestion on how to design a lightning conductor for the product is given below. Always follow the regulations in force in your country regarding grounding antennas and masts. These installations must be carried out by an authorised specialist. • To prevent damages due to indirect lightning strikes (voltage spikes) cables, for example for antenna, power source or modem should be protected with appropriate protection elements, like a lightning arrester. These installations must be carried out by an authorised specialist. • If there is a risk of a thunderstorm, or if the equipment is to remain unused and unattended for a long period, protect your product additionally by

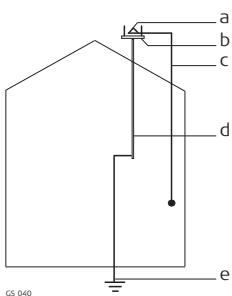
unplugging all systems components and disconnecting all connecting cables and supply cables, for example, instrument - antenna.

Air terminal arrangement, plan view



- a) Antenna
- b) Support structure
- c) Air terminal

Grounding the instrument/antenna



- a) Antenna
- b) Lightning conductor array
- c) Antenna/instrument connection
- d) Metallic mast
- e) Connection to earth

Warning

Using a battery charger not recommended by Leica Geosystems can destroy the batteries. This can cause fire or explosions.

Precautions:

Only use chargers recommended by Leica Geosystems to charge the batteries.

Caution

During the transport, shipping or disposal of batteries it is possible for inappropriate mechanical influences to constitute a fire hazard.

Precautions:

Before shipping the product or disposing of it, discharge the batteries by running the product until they are flat.

When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping contact your local passenger or freight transport company.

Warning

High mechanical stress, high ambient temperatures or immersion into fluids can cause leakage, fire or explosions of the batteries.

Precautions:

Protect the batteries from mechanical influences and high ambient temperatures. Do not drop or immerse batteries into fluids.

Warning

If battery terminals come in contact with jewellery, keys, metallised paper or other metals, short circuited battery terminals can overheat and cause injury or fire, for example by storing or transporting in pockets.

Precautions:

Make sure that the battery terminals do not come into contact with metallic objects.

Warning

Incorrect fastening of the external antenna to vehicles or transporters poses the risk of the equipment being broken by mechanical influence, vibration or airstream. This may result in accident and physical injury.

Precautions:

Attach the external antenna professionally. The external antenna must be secured additionally, for example by use of a safety cord. Ensure that the mounting device is correctly mounted and able to carry the weight of the external antenna (>1 kg) safely.

Warning

If the product is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gases are produced which may impair health.
- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion or environmental contamination.
- By disposing of the product irresponsibly you may enable unauthorised persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

Precautions:



The product must not be disposed with household waste. Dispose of the product appropriately in accordance with the national regulations in force in your country. Always prevent access to the product by unauthorised personnel.

Product-specific treatment and waste management information can be downloaded from the Leica Geosystems home page at <http://www.leica-geosystems.com/treatment> or received from your Leica Geosystems dealer.

Warning

Only Leica Geosystems authorised service workshops are entitled to repair these products.

6.6

Electromagnetic Compatibility EMC

Description

The term Electromagnetic Compatibility is taken to mean the capability of the product to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic disturbances to other equipment.

Warning

Electromagnetic radiation can cause disturbances in other equipment.

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed.

Caution

There is a risk that disturbances may be caused in other equipment if the product is used with accessories from other manufacturers, for example field computers, personal computers, two-way radios, non-standard cables or external batteries.

Precautions:

Use only the equipment and accessories recommended by Leica Geosystems. When combined with the product, they meet the strict requirements stipulated by the guidelines and standards. When using computers and two-way radios, pay attention to the information about electromagnetic compatibility provided by the manufacturer.

Caution

Disturbances caused by electromagnetic radiation can result in erroneous measurements.

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by intense electromagnetic radiation, for example, near radio transmitters, two-way radios or diesel generators.

Precautions:

Check the plausibility of results obtained under these conditions.

Warning

If the product is operated with connecting cables attached at only one of their two ends, for example external supply cables, interface cables, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.

Precautions:

While the product is in use, connecting cables, for example product to external battery, product to computer, must be connected at both ends.

Radios or digital cellular phones

Warning

Use of product with radio or digital cellular phone devices:

Electromagnetic fields can cause disturbances in other equipment, in installations, in medical devices, for example pacemakers or hearing aids and in aircraft. It can also affect humans and animals.

Precautions:

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment can be disturbed or that humans or animals can be affected.

- Do not operate the product with radio or digital cellular phone devices in the vicinity of filling stations or chemical installations, or in other areas where an explosion hazard exists.
- Do not operate the product with radio or digital cellular phone devices near to medical equipment.
- Do not operate the product with radio or digital cellular phone devices in aircraft.

6.7

FCC Statement, Applicable in U.S.



The greyed paragraph below is only applicable for products without radio.

Warning

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

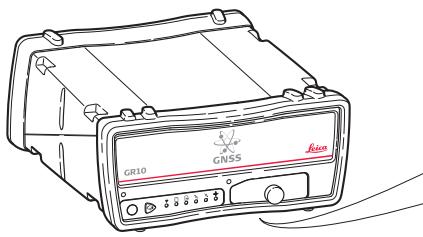
If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning

Changes or modifications not expressly approved by Leica Geosystems for compliance could void the user's authority to operate the equipment.

Labelling GR10



GR10_014

Type : GR10 S.No.:

Equip.No.: Art.No.:

Power: 12-24V⎓, nominal/2.5A max.

Leica Geosystems AG

CH-9435 Heerbrugg

Manufactured: 2010

Made in Switzerland



This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2)
this device must accept any interference received, including
interference that may cause undesired operation.

7

7.1

7.1.1

Technical Data

GR10 Technical Data

Tracking Characteristics

Instrument technology	SmartTrack+																																
Satellite reception	GR10: Multi-frequency, GPS, GLONASS and Galileo																																
Instrument channels	GR10: Up to 16 channels continuous tracking on L1, L2 and L5 (GPS); up to 14 channels continuous tracking on L1 and L2 (GLONASS); up to 14 channels continuous tracking on E1, E5a, E5b and Alt-BOC (Galileo); four channels tracking SBAS.																																
Supported codes and phases	<p> Depending on the satellite systems and signals configured in Satellite Tracking Settings Tracking a maximum number of 120 channels is allocated.</p> <p>GPS</p> <table border="1"><thead><tr><th>Type</th><th>L1</th><th>L2</th><th>L5</th></tr></thead><tbody><tr><td>GR10</td><td>Carrier phase, C/A-code</td><td>Carrier phase, C code (L2C) and P2-code</td><td>Carrier phase, code</td></tr></tbody></table> <p>GLONASS</p> <table border="1"><thead><tr><th>Type</th><th>L1</th><th>L2</th></tr></thead><tbody><tr><td>GR10</td><td>Carrier phase, C/A-code</td><td>Carrier phase, P2-code</td></tr></tbody></table> <p>Galileo</p> <table border="1"><thead><tr><th>Type</th><th>E1</th><th>E5a</th><th>E5b</th><th>Alt-BOC</th></tr></thead><tbody><tr><td>GR10</td><td>Carrier phase, code</td><td>Carrier phase, code</td><td>Carrier phase, code</td><td>Carrier phase, code</td></tr></tbody></table> <p>GPS Carrier tracking</p> <table border="1"><thead><tr><th>Condition</th><th>GR10</th></tr></thead><tbody><tr><td>L1, AS off or on</td><td>Reconstructed carrier phase via C/A-code.</td></tr><tr><td>L2, AS off</td><td>Reconstructed carrier phase via P2-code.</td></tr><tr><td>L2, AS on</td><td>Switches automatically to patented P-code aided technique providing full L2 reconstructed carrier phase.</td></tr></tbody></table>	Type	L1	L2	L5	GR10	Carrier phase, C/A-code	Carrier phase, C code (L2C) and P2-code	Carrier phase, code	Type	L1	L2	GR10	Carrier phase, C/A-code	Carrier phase, P2-code	Type	E1	E5a	E5b	Alt-BOC	GR10	Carrier phase, code	Carrier phase, code	Carrier phase, code	Carrier phase, code	Condition	GR10	L1, AS off or on	Reconstructed carrier phase via C/A-code.	L2, AS off	Reconstructed carrier phase via P2-code.	L2, AS on	Switches automatically to patented P-code aided technique providing full L2 reconstructed carrier phase.
Type	L1	L2	L5																														
GR10	Carrier phase, C/A-code	Carrier phase, C code (L2C) and P2-code	Carrier phase, code																														
Type	L1	L2																															
GR10	Carrier phase, C/A-code	Carrier phase, P2-code																															
Type	E1	E5a	E5b	Alt-BOC																													
GR10	Carrier phase, code	Carrier phase, code	Carrier phase, code	Carrier phase, code																													
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L2, AS off	Reconstructed carrier phase via P2-code.																																
L2, AS on	Switches automatically to patented P-code aided technique providing full L2 reconstructed carrier phase.																																

GPS code measurements	Condition	GR10
L1, AS off		Carrier phase smoothed code measurements: C/A-code.
L1, AS on		
L2, AS off		Carrier phase smoothed code measurements: P2-code and/or L2C code.
L2, AS on		Carrier phase smoothed code measurements: Patented P-code aided code and/or L2C code.



Carrier phase and code measurements on L1, L2 and L5 (GPS) are fully independent with AS on or off.

Satellites tracked	GR10: Up to 16 simultaneously on L1, L2 and L5 (GPS) + up to 14 simultaneously on L1 and L2 (GLONASS) + up to 14 simultaneously on E1, E5a, E5b and Alt-BOC (Galileo) + up to four SBAS
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7.1.2 Accuracy



Accuracy is dependent upon various factors including the number of satellites tracked, constellation geometry, observation time, ephemeris accuracy, ionospheric disturbance, multipath and resolved ambiguities.

The following accuracies, given as root mean square, are based on measurements processed using LGO and on real-time measurements.

The use of multiple GNSS systems can increase accuracy by up to 30% relative to GPS only.

Differential code	The baseline precision of a differential code solution for static and kinematic surveys is 25 cm.
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Differential phase in post-processing	Normal baseline with GR10 plus AS10			
	Static		Kinematic	
	Horizontal	Vertical	Horizontal	Vertical
	5 mm + 0.5 ppm	10 mm + 0.5 ppm	10 mm + 1 ppm	20 mm + 1 ppm

Long baseline with GR10 plus AR25

Static	
Horizontal	Vertical
3 mm + 0.5 ppm	6 mm + 0.5 ppm

7.1.3

Technical Data

GR10 Dimensions

The dimensions are given for the housing without the sockets.

Type	Length [cm]	Width [cm]	Thickness [cm]
Without bumpers	21.0	19.0	7.8
With bumpers	22.0	20.0	9.4

Weight

GR10 weight:

Type	Weight [kg]
Without bumpers	1.50
With bumpers	1.67

Recording

Data can be recorded on the SD card.



The figures shown are accurate to 1%. They are dependent on the additional tracking settings configured on the instrument.

4 GB card, GPS (L1+L2+L5), 12 satellites

Rate	MDB only	RINEX only	Hatanaka only
1 s	2180 h 3700 h zipped	450 h 1700 h zipped	1700 h 4500 h zipped
30 s	56550 h 95780 h zipped	12650 h 47380 h zipped	49700 h 108000 h zipped

4 GB card, GPS + GLONASS (L1+L2), 12/10 satellites

Rate	MDB only	RINEX only	Hatanaka only
1 s	1400 h 2400 h zipped	330 h 1240 h zipped	1220 h 3280 h zipped
30 s	38400 h 65000 h zipped	9100 h 34000 h zipped	36400 h 74800 h zipped

4 GB card, GPS + GLONASS + Galileo (L1+E5a+E5b+AltBoc), 12/10/10 satellites

Rate	MDB only	RINEX only	Hatanaka only
1 s	840 h 1400 h zipped	185 h 700 h zipped	680 h 1800 h zipped
30 s	23800 h 40300 h zipped	5050 h 19000 h zipped	20400 h 41350 h zipped

Power**24 V Power supply**

Condition	Power consumption
Logging at 1 Hz, with only the power supply and antenna connected	3.1 W
Logging and streaming at 1 Hz, with power supply, antenna and ethernet connected	3.5 W

Power consumption: 3.5 W typically, 24 V@150 mA

External supply voltage: Nominal 12 V DC (---, GEV71 car battery cable to a 12 V car battery), voltage range 10.5 V-28 V DC

Operating times

Designed for continuous operation.

Battery external

Type: NiMH
 Voltage: 12 V
 Capacity: GEB171: 9.0 Ah

Environmental specifications**Temperature**

Type	Operating temperature [°C]	Storage temperature [°C]
Instrument	-40 to +65	-40 to +80
Leica SD cards	-40 to +85	-40 to +85

Protection against water, dust and sand

Type	Protection
Instrument	IP67 (IEC 60529) Dust tight Waterproof to 1 m temporary immersion

Humidity

Type	Protection
Instrument	Up to 100 % The effects of condensation are to be effectively counteracted by periodically drying out the instrument.

Connector types

Port	Description
PWR	LEMO-1 female, 5 pin
Serial P1	LEMO-1 female, 8 pin
GNSS Antenna	TNC female
P3 Slot-in Antenna	TNC female
Oscillator	MMCX female
Ethernet	RJ45 ruggedised

Serial ports	<table border="1"> <thead> <tr> <th>Port</th><th>Description</th><th>Default setting</th></tr> </thead> <tbody> <tr> <td>P1</td><td>Baud rates 2400-115200 baud, incl. RTS/CTS</td><td>115200/N/8/1/N</td></tr> </tbody> </table>	Port	Description	Default setting	P1	Baud rates 2400-115200 baud, incl. RTS/CTS	115200/N/8/1/N
Port	Description	Default setting					
P1	Baud rates 2400-115200 baud, incl. RTS/CTS	115200/N/8/1/N					
Data output	<ul style="list-style-type: none"> Raw Data Almanac Ephemeris Position data 						
External oscillator input	External clock input: Frequency: 5 MHz or 10 MHz Input impedance: 50 Ω nominal Input VSWR: 2:1 maximum Signal level: 0 dBm minimum to +13.0 dBm maximum Frequency stability: +0.5 ppm maximum Wave shape: Sinusoidal Connector: MMCX female						
	 Please remove the External oscillator port cover before connecting the cable.						
Ethernet network interface	IEEE Standards: 8002.3 10BASE-T Ethernet 802.3u 100BASE-TX Fast Ethernet 802.3 Auto-negotiation Link Speed: 10/100 Mbps, Half/Full Duplex Protocol: CSMA/CD Connector: Ruggedised RJ45						

7.2

Antennas Technical Data

Description and use	The antenna is selected for use based upon the application. The table gives a description and the intended use of the individual antennas.	
AR25	Dorne & Margolin GPS, GLONASS, Galileo, Compass antenna element with 3D choke ring ground plane. Optional protective radome.	High end applications. For example, monitoring tectonic plate movements, first order control and reference station applications.
AT504 GG	Dorne & Margolin GPS, GLONASS L1/L2 antenna element with gold anodised choke ring ground plane. Complies with IGS type 'T' antenna, JPL design. Optional protective radome.	High end applications. For example, monitoring tectonic plate movements, first order control and reference station applications.

Type	Description	Use
AR10	GPS, GLONASS, Galileo, Compass reference station antenna with large ground plane and built-in radome.	General use for standard and high accuracy reference station and monitoring applications.
AS10	Compact geodetic GPS, GLONASS, Galileo antenna with built-in ground plane.	Standard network RTK and monitoring applications.

Dimensions	Type	AR25	AT504 GG	AR10	AS10
	Height	20.0 cm	14.0 cm	14.0 cm	6.2 cm
	Diameter	38.0 cm	38.0 cm	24.0 cm	17.0 cm

Connector	AR25: AT504 GG: AR10: AS10:	N-Type female N-Type female TNC female TNC female
Mounting	All antennas:	5/8" Whitworth Thread
Weight	AR25: AT504 GG: AR10: AS10:	7.6 kg, radome 1.1 kg 4.3 kg, radome 1.1 kg 1.1 kg 0.4 kg
Electrical data		

Type	AR25	AT504 GG	AR10	AS10
Voltage	3.3 V to 12 V DC	4.5 V to 18 V DC	3.3 V to 12 V DC	4.5 V to 18 V DC
Current	100 mA max	50 mA typical	100 mA max	35 mA typical
Frequency				
GPS:	L1, L2 (including L2C), L5.	L1, L2 (including L2C).	L1, L2 (including L2C), L5.	L1, L2 (including L2C), L5.
GLONASS:	L1, L2, L3.	L1, L2.	L1, L2, L3.	L1, L2.
Galileo:	E2-L1-E1, E5a, E5b, E5a+b (Alt-BOC), E6.	-	E2-L1-E1, E5a, E5b, E5a+b (Alt-BOC), E6.	E2-L1-E1, E5a, E5b, E5a+b (Alt-BOC).
Compass:	B1, B2, B3.	-	B1, B2, B3.	B1, B2.
Gain (typically)	40 dBi	29 dBi	29 dBi	27 dBi
Noise Figure (typically)	< 1.2 dBi max	3 dBi	< 2 dBi	< 2 dBi

Environmental specifications**Temperature**

Type	Operating temperature [°C]	Storage temperature [°C]
AR25	-55 to +85	-55 to +90
AT504 GG	-40 to +70	-40 to +70
AR10	-40 to +70	-55 to +85
AS10	-40 to +70	-55 to +85

Protection against water, dust and sand

Type	Protection
All antennas	IP67 (IEC 60529) Dust tight Protected against water jets Waterproof to 1 m temporary immersion

Humidity

Type	Protection
All antennas	Up to 100 % The effects of condensation are to be effectively counteracted by periodically drying out the antenna.

Cable length

Instrument	Antenna	Available cable lengths for all antennas [m]
GR10	AR25/AT504 GG/ AR10/AS10	1.2, 2.8, 10, 30, 50 and 70

7.3**7.3.1****Conformity to national regulations****Conformity to National Regulations****GR10**

- FCC Part 15, 22 and 24 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the product GR10 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity can be consulted at <http://www.leica-geosystems.com/ce>.



Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA member state.

- The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.

Frequency band	Type	Frequency band [MHz]
	GR10	GPS L1: 1575.42 GPS L2: 1227.60 GPS L5: 1176.45 GLONASS L1: 1602.5625-1611.5 GLONASS L2: 1246.4375-1254.3 Galileo E1: 1575.42 Galileo E5a: 1176.45 Galileo E5b: 1207.14 Galileo AltBOC: 1191.795

Output power	Type	Output power [mW]
	GNSS	Receive only

Antenna	Type	Antenna	Gain [dBi]	Connector	Frequency band [MHz]
	GNSS	External GNSS antenna element (receive only)	-	-	-

7.3.2

GFU24, Siemens MC75

Conformity to national regulations

- FCC Part 15, 22 and 24 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the GFU24 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity may be consulted at <http://www.leica-geosystems.com/ce>.
 Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA Member state.
- The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.

Frequency band	Quad-Band EGSM850 MHz/ EGSM900 MHz/ GSM1800 MHz/ GSM1900 MHz	
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Output power	EGSM850/900:	2 W
	GSM1800/1900:	1 W

Antenna	Type	GAT 3	GAT 5
	Frequency band [MHz]	890 - 960 / 1710 - 1880 / 1920 - 2170	824 - 894 / 1850 - 1990
	Type	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna
	Connector	TNC	TNC

Specific Absorption Rate (SAR)	The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.
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7.3.3

GFU19 (US), GFU25 (CAN) CDMA MultiTech MTMMC-C

Conformity to national regulations	<ul style="list-style-type: none"> FCC Part 15, 22 and 24 (applicable in US) The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 has to be approved prior to use and operation.
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Frequency band

Dual-Band CDMA850 MHz/CDMA1900 MHz

Output power

CDMA850:	2 W
CDMA1900:	0.4 W

Antenna

Type	GAT 5
Frequency band [MHz]	824 - 894 / 1850-1990
Type	Detachable λ/2 antenna
Connector	TNC

Specific Absorption Rate (SAR)	The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.
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7.3.4

SLG1-2, Telit 3G GSM/GPRS/UMTS

Conformity to national regulations

- FCC Part 15, 22 and 24 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the SLG1-2 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity may be consulted at <http://www.leica-geosystems.com/ce>. Class 1 equipment according European Directive 1999/5/EC (R&TTE) can be placed on the market and be put into service without restrictions in any EEA Member state.
- The conformity for countries with other national regulations not covered by the FCC part 15, 22 and 24 or European directive 1999/5/EC has to be approved prior to use and operation.



Frequency band

UMTS/HSDPA (WCDMA/FDD) 850 MHz/ 1900 MHz/ 2100 MHz
Quad-Band EGSM 850 MHz/ 900 MHz/ 1800 MHz/ 1900 MHz
GPRS multi-slot class 12
EDGE multi-slot class 12

Output power	EGSM850/900: 2 W GSM1800/1900: 1 W UMTS2100: 0.25 W EDGE850/900: 0.5 W EDGE1800/1900: 0.4 W
---------------------	---

Antenna	Type	Internal	GAT 3	GAT 5
Frequency band [MHz]	824 - 894 / 890 - 960 / 1710 - 1880 / 1850 - 1990 / 1920 - 2170		890 - 960 / 1710 - 1880 / 1920 - 2170	824 - 894 / 1850 - 1990
Type	Internal	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna	
Connector	-	TNC	TNC	

Specific Absorption Rate (SAR)	The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.
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7.3.5

SLR1-2, SATEL SATELLINE-TA11

Conformity to national regulations

- FCC Part 15 (applicable in US)
- Hereby, Leica Geosystems AG, declares that the product SLR1-2 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. The declaration of conformity can be consulted at <http://www.leica-geosystems.com/ce>.



Class 2 equipment according European Directive 1999/5/EC (R&TTE) for which following EEA Member States apply restrictions on the placing on the market or on the putting into service or require authorisation for use:

- France
- Italy
- Norway (if used in the geographical area within a radius of 20km from the centre of Ny-Ålesund)

- The conformity for countries with other national regulations not covered by the FCC part 15 or European directive 1999/5/EC has to be approved prior to use and operation.

Frequency band

403 MHz - 470 MHz

Output power

SLR1-2: 0.5 W-1.0 W

Antenna	Type	Internal	GAT 1	GAT 2
	Frequency band [MHz]	400 - 470	400 - 435	435 - 470
	Type	Internal	Detachable $\lambda/2$ antenna	Detachable $\lambda/2$ antenna
	Connector	-	TNC	TNC

Specific Absorption Rate (SAR)	The product meets the limits for the maximum permissible exposure of the guide-lines and standards which are force in this respect. The product must be used with the recommended antenna. A separation distance of at least 20 centimetres should be kept between the antenna and the body of the user or nearby person within the intended application.
---------------------------------------	---

International Limited Warranty, Software Licence Agreement

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Appendix A Directory Structure of the Memory Device

Directory structure	--- DATA	Storing raw data logging data
	--- Session1*	
	--- Session2*	
	--- Session3*	
	--- Transfer	Upload and download files
	--- Antenna	Upload antenna files
	--- Firmware	Upload firmware files
	--- Options	Upload option files
	--- Language	Upload language files
	--- Settings	Upload system configuration

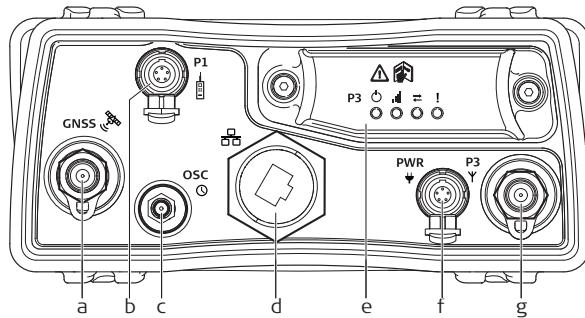
* The name of the directory shown will be the configured Logging session name. For example an MDB, RINEX or Hatanaka raw data logging session. Refer to the "GR10 Operational Manual (Online Help)" for further information.

Appendix B GR10 Pin Assignments and Sockets

Description

Some applications require knowledge of the pin assignments for the GR10 ports. In this chapter, the pin assignments and sockets for the ports of the GR10 are explained.

Ports on the instrument rear panel



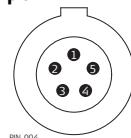
- a) **GNSS:** GNSS Antenna port TNC
- b) **P1:** Serial port, 8 pin LEMO
- c) **OSC:** Oscillator port
- d) **Ethernet port:** Ruggedised RJ45
- e) **P3:** Communication Slot-in port
- f) **PWR:** Power port, 5 pin LEMO, dual input
- g) **P3:** Communication Slot-in port Antenna, TNC

Pin assignments for P1: Serial Port



Pin	Signal Name	Function	Direction
1	USB_D+	USB data line	In or out
2	USB_D-	USB data line	In or out
3	GND	Signal ground	-
4	RxD	RS232, receive data	In
5	TxD	RS232, transmit data	Out
6	ID	Identification pin	In or out
7	PWR	Power input, 10.5 V-28 V	In
8	TRM_ON/USB_ID	RS232, general-purpose signal	In or out

Pin assignments for PWR: Power port



Pin	Signal Name	Function	Direction
1	PWR1	Power input, 11 V-28 V	In
2	ID1	Identification pin	In
3	GND	Signal ground	-
4	PWR2	Power input, 11 V-28 V	In
5	ID2	Identification pin	In

Sockets

Port P1:
LEMO-1, 8 pin, LEMO EGI.1B.308.CLN
Port PWR:
LEMO-1, 5 pin, LEMO HMG.1B.305.CLNP

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- when it has to be **right**

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